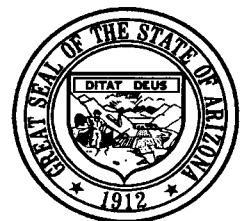


Future Directions



12.1 INTRODUCTION

The Phoenix Active Management Area (AMA) is a rapidly growing area with a diverse economy. Residential, commercial, and industrial growth are occurring at a record pace with similar projections for future years. Water use patterns are also showing corresponding increases. Agriculture continues to hold its position as the largest water using sector in the AMA, even though thousands of agricultural acres are converted to urban uses every year. Negotiations on Indian water settlements, as well as negotiations with the federal government on Central Arizona Project (CAP) settlements, have occurred and will continue to occur.

Constant and diverse pressures are exerted on the local water resource base. It is clear that the future of this AMA will not resemble the past. What is certain is that change will continue at a rapid pace; management issues will become even more complex and far-reaching requiring greater regional cooperation; and the ability to meet these challenges will become more important.

Significant progress has been made in the management of the resource. Over the course of the second management period, many new programs, rules, and laws were enacted to aid in the distribution, conservation, augmentation, and management of the water supplies within AMAs. During the third management period, the Department will continue to develop new approaches to move the AMAs closer to their management goals and to protect water supplies for future use.

This Future Directions chapter is intended to provide the Department's perspective on long-term water management issues in the Phoenix AMA. It also describes future activities and alternatives for consideration that address key issues, assist in the achievement of safe-yield, and establish the framework for long-term water sustainability. Some of the concepts or directions discussed in this chapter may fall outside the Department's responsibility or authority. In addition, resolution of the continuing obstacles to safe-yield may require institutional and legislative changes or revised management approaches.

The First Management Plan initiated basic water management programs through mandatory conservation requirements for major water users. The Second Management Plan established more comprehensive and aggressive conservation requirements, coupled with an augmentation program.

This Third Management Plan was developed by building on programs that were incorporated into the First and Second Management Plans. The Third Management Plan also incorporates some new programs that will result in incremental progress toward the achievement of the safe-yield goal. Most important, it identifies alternative strategies for consideration in moving toward attainment of safe-yield. While wise water management has advanced in 15 years and should demonstrate further improvement in certain sectors during the third management period, it is apparent that considerably more effort will be required to achieve the AMA-wide safe-yield goal as well as the local management goal of a stable, long-term water supply.

12.2 THE DEPARTMENT'S PERSPECTIVE ON WATER MANAGEMENT IN THE PHOENIX ACTIVE MANAGEMENT AREA

Groundwater use in the Phoenix AMA currently exceeds the rate of natural and incidental recharge, resulting in an overdraft of over 360,019 acre-feet per year. Although the AMA is fortunate to have multiple sources of renewable water available, these sources remain underutilized to varying degrees. The low cost of groundwater in relation to the higher costs of most renewable water supplies is the primary reason for this condition. The water budgets in Chapter 11 illustrate that, based on current projections of water demand and supply, the Phoenix AMA will not be at safe-yield in 2025. Although safe-yield is an attainable goal, it is apparent that sufficient progress has not been made toward this goal, nor have the statutory and institutional structures necessary to succeed been fully established. In addition, increased

knowledge of local impacts of groundwater use, such as land subsidence and changes in groundwater quality, and concerns about long-term supply reliability have led to consideration of water resource management on a smaller scale than AMA-wide. There currently exists a lack of understanding and support by the community for a full range of water management initiatives. Knowledge by the community of the issues facing the AMA and the implications of failing to address these issues are necessary elements of any program strategy. The problems associated with achieving safe-yield, the need to educate the community on water issues, as well as the emergence of serious water management problems in certain localized areas within the AMA have led to the need to reassess the goals and the tools available to attain them.

12.2.1 The Safe-Yield Goal

In theory, safe-yield is a balance between groundwater withdrawals and recharge, resulting in stabilizing water levels on an AMA-wide basis over time. In practice, safe-yield is a much more complicated concept. Aquifer water levels are affected by underground storage and recovery activities, aquifer compaction due to subsidence, and withdrawal of groundwater made pursuant to various groundwater withdrawal authorities. Under these conditions, water levels may never completely stabilize. (The complexities are more fully described in the Preface to Section II.) Safe-yield is closely related to the concept of sustainability, which means that resource availability does not diminish over time. Safe-yield is entirely consistent with the goal of ensuring reliable long-term water supplies.

Support continues to exist for the safe-yield goal in the Phoenix AMA, but concerns exist regarding inequities in the allocation of costs and benefits between the sectors. In particular, there are concerns that the municipal sector is the only sector required to utilize renewable supplies. The municipal sector is required, through the Assured Water Supply Rules (AWS Rules), to develop and use renewable water supplies to sustain its future growth. This requirement is based on the fact that the municipal sector is allowed to grow and increase its water use over time. The agricultural sector, on the other hand, is subject to the statutory requirement that no new agricultural lands be brought into production after 1980. In addition, agricultural demand is expected to decrease over time as urbanization occurs on previously farmed lands. For those reasons, the drafters of the Groundwater Code did not include a requirement for the agricultural sector to use renewable water supplies.

The industrial sector has no renewable resource requirement, yet is expected to grow as urbanization increases.

Indian community demand is expected to increase significantly; however, Indian water use is not subject to the requirements of the Code as all other uses are.

On the positive side, multiple tools and agencies, such as the AWS Rules; the Underground Water Storage, Savings and Replenishment Act; the Central Arizona Groundwater Replenishment District (CAGRDR); and the Arizona Water Banking Authority (AWBA), in addition to Departmental programs, are focused on addressing specific portions of the water management agenda. Critical accomplishments in this area include:

- Over 677,000 acre-feet of CAP water was delivered to the AMA in 1997, continuing an upward trend since 1992. Of this amount, 277,000 acre-feet was directly used by municipal, industrial, and agricultural users and 400,000 acre-feet was stored in underground facilities and in groundwater savings facilities.
- Twenty-two full-scale underground storage and groundwater savings recharge facilities have been permitted in the AMA during the last 10 years. In that time, 564,000 acre-feet has been stored and

almost 700,000 acre-feet of annual storage capacity has been permitted. In addition, 11 pilot-scale recharge facilities have been permitted.

- The AWS Rules are in place with renewable resource requirements for municipal growth.
- The Department has developed hydrologic models and uses them to assist community water management planning efforts.
- Municipal gallons per capita per day requirements assume water efficiency levels for all new housing units and turf allotments ensure efficient use for turf-related facilities.
- Over \$6 million has been awarded by the Department in the Phoenix AMA for conservation and augmentation assistance grants and contracts.

The Department will identify and develop additional programs as necessary in the future.

12.2.2 Critical Area Management

There is growing consensus throughout the AMA that there is a need to separately address serious water management problems in specific geographic areas of the AMA. Hydrologic conditions vary widely within the Phoenix AMA, ranging from the waterlogged, southwest portion of the AMA to areas of severe overdraft, such as portions of the Carefree Subbasin. Land subsidence, earth fissures, and resulting aquifer compaction due to water level declines have been documented in numerous areas of the AMA. Water supply reliability is a concern for most municipal water providers in these areas, as well as for homeowners using their own domestic wells and industries using their own wells. Groundwater model projections made by the Department have identified areas of the AMA that, although are not demonstrating current problems, are expected to experience severe problems in the future if they continue to rely on groundwater.

Access to renewable water supplies is not uniform throughout the AMA. To address the variety of water-related concerns during the third management period, water management tools and processes need to be developed in association with local communities to address long-term water issues on a subregional or “critical area” basis.

12.2.3 Conjunctive Use and Management of Supplies

The Code provides a relatively consistent basis for the management of groundwater within AMAs. However, CAP water, non-CAP surface water, and effluent are all regulated differently and owned or controlled by different jurisdictions. As the Phoenix AMA uses significant amounts of all sources of water, the ability to directly manage only one source (groundwater) may weaken conservation requirements and use restrictions and make safe-yield attainment more difficult. The use of non-groundwater sources of water in an efficient manner allows more demand to be served by renewable water, meaning less reliance on groundwater. The ability to conjunctively manage all water supplies and work toward a safe and reliable water supply for the future is a logical long-term goal.

12.2.4 Utilization of Renewable Supplies

The Phoenix AMA has multiple sources of water available for use. In addition to groundwater, a non-renewable source, there are three significant renewable sources: CAP water; non-CAP surface water, such as Salt River Project water; and effluent. As has been described earlier in this plan, groundwater is over-utilized and renewable sources are underutilized. This is due primarily to the relatively low cost of producing and delivering groundwater and the significantly higher costs of producing and delivering renewable sources. Of the approximately 286,000 acre-feet of effluent produced in 1995, only slightly

more than 100,000 acre-feet was used. Effluent use must receive more attention during the third management period.

12.2.5 Implications of Indian Water Rights Claims

The current water management structure is constrained by outstanding Indian water rights claims. While some tribes have settled their claims in recent years, the largest claims remain unsettled. Failure to reach a final resolution of the issue leaves major questions about water supply and demand unanswered. Because the activities of off-reservation water users affect on-reservation conditions and vice versa, the Department will work to coordinate the water issues across reservation boundaries.

12.2.6 Integration of Water Quality Management

Water quality management problems must be addressed with water supply management needs in mind. Opportunities to match supplies of different qualities to appropriate uses and management of remediation efforts to maximize the beneficial use of treated water are part of efficient management of our water resources. Department actions will be consistent with these objectives. To work toward these objectives, the Department will closely coordinate its efforts with the Arizona Department of Environmental Quality (ADEQ) with particular emphasis in the following areas:

- Development and implementation of ADEQ effluent reuse regulations.
- Participation in the design and review of remedial action projects, including the type and amount of beneficial end uses.
- Monitoring and evaluation of the impacts of incentives for remediation. These incentives include the conservation requirement exemption and the assured water supply groundwater account exemption of 65,000 acre-feet statewide in light of AMA-wide and local area water management goals.

The Department's increased role in ADEQ's remediation programs and better integration of the data bases of the two agencies are positive steps in this coordination effort.

12.2.7 Economic Implications of Water Management

A better understanding of the economic implications of different management programs, as well as the long-term costs of not adequately managing our water resources, must be developed and communicated to water users and elected officials. In evaluating alternative management strategies, it is important to identify the cost factors involved. Management strategies must be analyzed from the perspective of total costs and benefits to the community. Decisions must be economically justified considering the long-term needs and concerns of the community. If additional regulatory approaches are considered, they should be weighed against alternative approaches, such as incentives or direct assistance.

12.2.8 Integration of Land Use Planning with Water Policy Planning

A closer association between land use planning and water policy planning is needed. County and local land use and economic development planning programs must continue to plan for and incorporate water supply and infrastructure requirements. Principal areas to be considered in the development process are:

- The need to secure and utilize renewable water resources that meet the AWS Program criteria for new residential development.

- Strategic location of wastewater treatment facilities and underground storage facilities to maximize the effective use of renewable water sources and to stabilize the local area aquifers.
- An understanding of the groundwater characteristics in local areas that may impact the community. These include changes in depth to groundwater, water quality changes, and land subsidence.
- The need to evaluate the water resource implications of development occurring on desert land rather than on retired farmland.
- Economic factors such as jobs created per gallon of water used, ability to utilize effluent or poor quality water, ability to develop aggressive reuse programs, etc.

The Department may be able to assist by providing relevant water demand and supply information, scenario analysis using hydrologic models, and planning assistance. The areas identified above need to be more closely linked to local general plans, zoning, infrastructure development, and other development decisions.

12.2.9 Community Understanding and Support

Community support is a key ingredient in the development of any local or regional program, but it is particularly important in setting water policy. The quality, quantity, and cost of the water supply are issues that concern every citizen, and their importance in the Phoenix AMA cannot be overstated. Unfortunately, very few are aware of the current groundwater overdraft conditions in the AMA and the implications of this condition if it goes unchecked. A heightened awareness of the negative implications of continued groundwater depletion and the need to pay higher costs to efficiently use more renewable resources must occur. Many people focus on growth and visible water uses such as golf courses as the cause of the problem, without recognizing that current groundwater users in every sector already exceed the natural groundwater replenishment rate. Equity considerations must move beyond the needs of current water users and consider ecological values and the needs of future generations.

12.3 OBSTACLES TO ACHIEVING SAFE-YIELD

This section identifies some of the factors limiting achievement of safe-yield and the Department's proposed role in addressing these problems.

12.3.1 Residual Groundwater Pumping

Municipal, industrial, and agricultural users are all expected to continue to pump groundwater beyond 2025. In the municipal sector, the ongoing pumping associated with undesignated providers (municipal providers without an assured water supply designation) is about 65,000 acre-feet per year. Pumping associated with untreated providers (that have no replenishment obligation) is 53,686 acre-feet per year. Most municipal water use will be served by designated providers. Designated providers are required to utilize renewable supplies, but are authorized to pump some groundwater (a total annual average of 42,000 acre-feet). In the agricultural sector, most of the remaining future demand is expected to be supplied by groundwater. Current groundwater use in this sector is approximately 572,000 acre-feet per year. The industrial water use sector will also contribute significantly to overall groundwater use. Current industrial pumpage is approximately 71,000 acre-feet per year. It is projected that moderate increases will occur in this sector through 2025.

Continued groundwater use in these sectors is authorized through service area rights, the AWS Program groundwater accounts, grandfathered rights (irrigation and Type 1 and Type 2 non-irrigation), and groundwater withdrawal permits. The authorization for such pumping under the Code was not made with

a full understanding of its relationship to the attainment of safe-yield. The total of all “allowable” pumping in the Phoenix AMA exceeds natural, incidental, and artificial recharge and is therefore a significant obstacle to the achievement of safe-yield. Any evaluation of the AMA’s ability to reach safe-yield must address the problem of groundwater pumping that is expected to continue past 2025 by grandfathered right holders, water providers, and permit holders.

12.3.2 Important Factors Not Affected by Regulatory Programs

Many factors that affect the ability to achieve safe-yield are outside of the influence of current water management programs. Water demand is affected by economic and demographic conditions. For example, as crop prices rise, so do the number of acres in production. More acres planted (within the total certified irrigation acres) in most cases results in higher water demand. Increases in population and industrial growth rates have a dramatic influence on water use. More people and industries results in higher water demand. The location of new development has a dramatic effect on water resources planning. A key assumption of the Code was that urban growth would largely occur on retired agricultural land, with the water no longer needed by the farms being available to serve new houses and industries. In fact, much of the new growth is occurring on native desert land rather than on retired farmland. Development on desert land does not result in one type of demand replacing another; it results in a new demand being added to the existing demands, resulting in significantly greater demands than originally assumed.

Water costs strongly affect the amount of water use in all sectors. The undervalued cost of water in most instances, as well as the cost differential between certain renewable sources of water and groundwater, provides little incentive to maximize efficiency or reduce groundwater use. The cost of using groundwater should reflect the cost of overdrafting the aquifer. These costs include the loss of a supply, land subsidence and aquifer compaction, and water quality degradation.

Indian water rights settlements and leases have direct and significant influence on water use characteristics. Amounts and types of water identified in Indian settlements will affect the ability to achieve safe-yield.

12.3.3 Conjunctive Water Management

The Department currently has the authority to regulate only groundwater use. It has no authority to directly regulate other sources. However, under the Department’s “stacking” policy (described in the Preface to Section II), if a person subject to a maximum annual water allotment uses both groundwater and non-groundwater supplies, the amount of non-groundwater supplies that are used by the person will be counted when determining the person’s compliance with the allotment. The impact of the current stacking policy, in comparison to estimated water savings under a conjunctive use management program, needs to be determined. In an AMA with multiple water sources, the ability to effectively manage only one of four principal sources of water may be problematic.

12.3.4 Continuing Conservation Efforts

Developing a shared understanding of and a commitment to water conservation is important. Although it is accurate to say that renewable resource development will significantly contribute to the attainment of safe-yield, it is shortsighted to de-emphasize the contribution of conservation. It is contrary to good water management to invest billions of dollars to secure and develop a large renewable resource base but not make a strong commitment to use those resources efficiently. Yet, in certain instances, this strong commitment has not been made. At a minimum, water users should invest in conservation to the point where the cost of water saved through conservation efforts is equal to the cost of developing and supplying a non-groundwater replacement supply.

It has proven difficult to maintain a strong conservation ethic during times of surplus supply. Although the availability of excess Colorado River supplies is expected to continue in the short-term, shortages are expected, on average, 30 percent of the time in the next 100 years. Perhaps more important, Colorado River supplies are projected to be cut back 50 percent of the time after 2050.

Also, local governments and members of the development community need to understand the long-term implications of the decisions they make today. Responsible development and forward-thinking governmental decisions regarding growth and investments/commitments to conservation programs ensure long-term water resource sustainability. This philosophy and approach will be even more important in “critical areas.” It is much easier to achieve conservation objectives when people understand that there is an imminent water supply problem. Conservation goals need to be reinforced through pricing structures, ordinances, incentives, informed governmental decisions, and public information about the serious long-term nature of water supply limitations in the area. The Department continues to believe that strong conservation efforts are an essential and valuable water management technique. The Department’s programs are focused on the areas with the greatest conservation potential and in sectors that are expected to continue using mined groundwater. This focus on the future will provide substantial benefits over time.

12.3.5 Regulation of Private Water Companies

Private water companies have repeatedly pointed out that they have difficulty meeting Department conservation requirements and converting to renewable water sources. This is due to their lack of regulatory authority as it pertains to establishing ordinances and because of perceived conflicts between the Department’s objectives and those of the Arizona Corporation Commission (ACC). Discussions have occurred between the Department and the ACC concerning the abilities of private water companies to recover investments in the development and use of renewable water supplies and the cost of conservation programs. Policies and procedures of both agencies regarding these matters are not effectively integrated. Some of these issues are resolvable by closer agency coordination and a strong commitment from both agencies. Other issues may require remedies that the two agencies are not currently capable or authorized to provide.

12.3.6 Public Education Efforts and Community Support

A major obstacle in developing and implementing water management programs is the lack of understanding by the public and the policy makers of the water management issues facing this AMA. The lack of a common understanding of the facts and issues severely constrains consensus on the complexity and seriousness of water management issues. This, combined with inaccurate and misleading information developed within certain communities alleging the absence of water management issues, hinders efforts at wise water management. As a result, persons in positions to make critical decisions regarding the development and financing of conservation and renewable resource programs are not always presented with clear, rational, cost-effective options.

12.4 CONSIDERATIONS REGARDING SAFE-YIELD AND CRITICAL AREA MANAGEMENT

Overcoming some of the challenges to achieving safe-yield may require legislative or rule changes. The Department will work with water users and regional entities to identify optimal responses to the problems that have been identified and the timeframe within which these responses are necessary. In order to develop a consensus response, a number of committees or task forces need to be established to work on solutions. Both local (AMA) and state-wide task forces will be established. Depending on the subject matter involved, issues identified at the AMA level could be considered at the state level if more than one AMA is affected by the problem or could benefit from the proposed solutions. The “big picture” issues

relating to the basic structure and effectiveness of Groundwater Code provisions will be addressed at the state level, with full representation of each major water-using sector within each of the AMAs.

One area that clearly merits further discussion in the Phoenix AMA is development of the “critical area” concept. In this context, specific problem areas within the AMA could be targeted with incentives for recharge, restrictions on new pumpage, enhanced monitoring, or regional planning and technical assistance. Specific tools and authorities could potentially be developed, such as limiting new uses in the area. The impact of new exempt wells in critical areas may need to be evaluated. Activities of the CAGR and AWBA might be expanded to allow for replenishment on behalf of certain users who are not currently able to participate. Such activities could be focused in critical areas as well.

The approaches that are listed below should, in some combination, begin addressing the issues and overcoming the obstacles previously described.

12.4.1 Existing and Projected Overdraft

The main reasons for current and projected overdraft conditions are residual pumping and underutilization of renewable water sources. The Department will reevaluate the effectiveness of various Code provisions in moving toward the safe-yield goal by addressing sectors that are expected to cause ongoing groundwater depletions. The municipal sector is responsible for developing renewable resources to meet significant percentages of demand. Both the industrial and agricultural use sectors have no such responsibilities. The Department will evaluate alternative programs and authorities to meet the objectives of ensuring that all groundwater pumpers contribute to achieving safe-yield in some capacity.

In the area of residual pumping, possible evaluations, programs, and authorities could be:

- Limit or eliminate the ability of irrigation grandfathered rights to be converted to Type 1 non-irrigation rights with no replenishment obligation, or reexamine the conversion rate.
- Reduce groundwater mining by new General Industrial Use permits either through pumping limitations or a replenishment obligation, or by requiring the permit holder to first use available, underutilized renewable sources of water.
- Limit or require replenishment by new residential growth in small dry-lot subdivisions, existing undeveloped lots, and new subdivisions of less than six lots that are not subject to the AWS Rules. These categories of development are currently not required to use renewable sources of water, demonstrate physical availability of water supplies, or undergo well impact analyses by the Department when drilling exempt wells.
- Establish replenishment requirements for undesignated municipal providers and reevaluate allowable groundwater pumping by designated providers.
- Ensure that all water uses associated with a development plan, including golf courses, are required to meet the assured water supply restrictions regarding renewable water sources.
- Establish programs that will cause a reduction in groundwater use by agriculture. This may include incentives to reduce pumping, higher withdrawal fees to discourage pumping, replenishment obligations for agriculture’s contribution to overdraft conditions, or a purchase and retirement program.

In the area of underutilization of renewable resources, possible programs and authorities could be:

- Address the disparity between the cost of groundwater and the cost of renewable supplies.
- Develop programs to increase utilization of renewable supplies, including effluent, that are consistent with overall management objectives, particularly in the sectors with the highest residual pumping.
- Encourage the CAGRD to expand its authority to replenish supplies for members and non-members.
- Increase public education efforts. Ensure that local officials, the general public, community groups, and the development community understand the complexity and seriousness of these issues and the positive aspects of renewable resource development and use in the long-term.

In addition to evaluating the reasons for overdraft, it is necessary to further determine and update the negative impacts of overdraft. The Department will:

- Further develop and continue to monitor land subsidence activities in the AMA.
- Identify and quantify existing problems created by excessive pumping, which include land subsidence and earth fissures, aquifer compaction, water quality degradation, declining groundwater levels, and physical availability problems under the AWS Program.
- Reexamine the assured water supply depth-to-water rule which currently allows groundwater levels to decline to 1,000 feet below the land surface over 100 years. This depth-to-water provision may need to be more closely tied to impacts and damage caused by groundwater declines. It is conceivable that under the current 1,000 foot limit, substantial irreversible damage could occur prior to the limit being reached.
- Develop groundwater modeling capabilities that would result in the ability to predict the extent and rate of subsidence. The ability to correlate pumping and soil conditions to land subsidence rates would be an invaluable tool in a rapidly urbanizing area.

12.4.2 Limited Authority to Manage All Sources of Water

The impact of managing all sources of water in comparison to the current groundwater authorities needs to be determined. If the amount of overdraft can be significantly reduced by a conjunctive use management approach, consideration should be given to developing revised authorities, incentive-oriented financing, or other mechanisms to encourage the use of renewable sources of water.

12.4.3 Indian Water Rights Claims

The Department will assist the Office of Indian Water Rights Settlement Facilitation in its settlement activities. Water management issues and perspectives either on an AMA-wide or critical area basis should be provided by the Department. Technical assistance could be provided in the areas of future conditions analysis and conservation program development.

12.4.4 Integration of Water Quality Management

The Department will focus on two program areas:

- A better understanding of and closer coordination with ADEQ in developing and implementing effluent reuse standards, the Aquifer Protection Permit program, and gray water use programs could result in more opportunities for reuse and recharge of effluent in the AMAs.
- Through the ADEQ's Water Quality Assurance Revolving Fund (WQARF) Program, the Department will participate in the review and development of groundwater remediation programs with particular emphasis on reinjection and beneficial end uses. The Department will assess the water management impacts of recent legislative directives regarding the exemption of WQARF pumpage in determining compliance with conservation programs and with the groundwater account provisions of the AWS Program.

12.4.5 Closer Integration of Community Development with Water Policy Planning

Issues and obstacles raised in earlier sections are being grouped together under this section due to their interrelated nature within the community. The following issues and obstacles have much in common:

- Integration of land use planning with water policy planning
- Important factors not affected by regulatory programs
- Economic implications of water management
- Community understanding and support

All of these occur within, have an impact on, and can be addressed by communities. Community decisions, be they zoning, water and wastewater infrastructure development and location, establishment of water rates and development fees, development of conditions of new service, and enactment of ordinances and conservation programs, can and should be based on an understanding of the short-term and long-term costs and benefits. An obstacle to developing and implementing responsible water management programs is the lack of understanding by the public and the policy makers of the water management issues facing them. The Department will continue to work with community groups, citizens, and local officials by assisting in the development of responsible water management programs with technical and financial assistance.

12.4.6 Commitment to Conservation

Efficient use of all sources of water continues to be a Department objective. Demand reduction through efficient use will narrow the gap between water demand and renewable supplies. Chapters 4, 5, and 6 continue the imposition of conservation requirements on all major use sectors. The Department will continue to analyze cost-effective conservation technology and improved water management techniques. Special attention will be paid in the early years of the third management period in developing more effective conservation programs for the agricultural use sector.

12.4.7 Regulation of Private Water Companies

The Department will continue to work with private water companies, the ACC, and the Legislature to develop programs that result in a greater emphasis on conservation and renewable resource programs.

12.4.8 Critical Area Management

All of the ideas and potential activities described in this chapter to address AMA-wide water management issues pertain to critical area management as well. The primary difference is that the issues and obstacles within critical areas are generally more severe. To address these localized water management problems, the Department will develop state/ local partnerships. A combination of Department initiatives and complementary initiatives at the local level will be used to assist and stabilize these areas. The types of

Department actions contemplated for critical area management will be similar to those described at the end of each AMA-wide discussion of ideas and activities. In addition, the following will be considered:

1. Obtain the authority to protect non-recoverable water and water that is stored in critical areas but is recovered outside the area of impact from new users and from existing residual pumpers who do not shift onto renewable supplies.
2. Provide the ability to manage water levels in critical areas by restricting pumping using the following mechanisms:
 - Limiting new General Industrial Use permits
 - Restricting the ways in which new service areas can be established
 - Limiting Type 1 conversions
 - Increasing conservation requirements
 - Buying out or providing incentives for extinguishing existing grandfathered rights in specific areas
 - Limiting new exempt wells
3. Cause the CAGRD and the AWBA to replenish supplies in critical areas or in the location where the groundwater pumping obligation was incurred.
4. Require groundwater pumpage that is to be replenished to be consistent with the management plan drawdown criteria in Chapter 8. These criteria currently apply only to storage credits that are recovered outside the area of hydrologic impact, but could be expanded to address all pumpage that is recharged or replenished in another location.
5. Develop well spacing rules that have specific provisions to protect critical areas.
6. Provide economic or regulatory incentives to utilize renewable supplies in lieu of pumping groundwater in critical areas.

12.5 CONCLUSIONS

The key to effective water management is to anticipate change and to develop systems flexible enough to respond to conditions unlike those experienced today. As has been noted many times, the one certainty of the future is that it will be unlike the past. The ability to identify and understand trends in water use and supply is central to the functions of the Department. It will be necessary to expand basic monitoring programs, improve the collection and management of the data that are collected, and improve hydrologic modeling capabilities to effectively manage the state's water supplies in the context of change. The Department intends to expand its technical and advanced planning capabilities to better serve the state and the AMAs in the next management period.

This Chapter has identified the agenda for activities within the Phoenix AMA that will contribute to the AMA's goals and objectives. Numerous ideas and activities have been described. The Department believes that, of all the issues raised and obstacles identified, developing a program for resolving critical area problems and addressing new groundwater withdrawal authorities should receive immediate attention. The Department will continue to work with community interests to develop innovative, cooperative solutions and to respond to the area's changing needs.